



# **Overview of ebXML**

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# An Overview of E-Commerce and ebXML

**“Historically, standards within the information technology industry have been pushed by vendors. Uniquely ebXML has been pulled by its user community.”**  
*—Simon Nicholson, OASIS director and marketing strategist, Sun Microsystems*

## AREAS COVERED IN THIS CHAPTER

- ◆ What is e-commerce?
  - What is its economic value?
  - Business-to-business (B2B) versus business-to-consumer (B2C)
  - What is B2C e-commerce?
  - What is B2B e-commerce?
- ◆ How do we build B2B systems?
  - Developing applications and application programming interfaces
  - How would applications talk to each other?
  - Electronic trading and interchange
  - EDI versus XML
- ◆ Why are there standards for electronic trading?
  - What is a standard?
  - Standard versus specification
  - Open standard versus proprietary

*(continues)*

**AREAS COVERED IN THIS CHAPTER (*Continued*)**

- ◆ **Why ebXML?**
  - **Before ebXML: Brief history of e-commerce standards**
  - **Who is involved in ebXML**
  - **Should you be involved in ebXML**

In the introduction to this book, we learned that the Extensible Markup Language (XML) and electronic business XML (ebXML) standards are intended to define an e-commerce infrastructure for worldwide trading partners. In this chapter, we discuss the business context for ebXML, including different models of e-commerce, electronic trading, and related standards. We begin by defining e-commerce, and then we examine the different types of e-commerce business models.

## **What Is E-Commerce?**

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Electronic commerce (e-commerce) covers a broad spectrum of online businesses, including:

- Individual consumer buying collectibles on an auction site such as eBay
- Real estate agents advertising representation services and listing properties
- Large corporations with a multitude of products and services

In the following sections, we examine why companies engage in e-commerce. We discuss the potential benefits of e-commerce and the economic value of ebXML as an e-commerce standard.

## **The Economic Value of E-Commerce**

Every business is part of a *value-added supply chain* (value chain), with suppliers on the buy side and customers on the sell side. Cost-saving methods usually focus on the buy side of the value chain and on improving the productivity of systems and processes that interact with suppliers. Revenue-enhancing benefits usually focus on the sell side of the value chain and on improving the productivity of systems and processes that interact with customers.

The benefits of e-commerce from both the buy side and sell side include:

**Improved productivity.** This benefit is usually measured in terms of the cost savings that result by lowering the cost of transactions. For example,

a company can automate a paper-based manual process such as requisitioning by using a purchasing application on a computer.

**Improved policy compliance.** Policy compliance measures improve the quality and efficiency of business operations. For example, a company can set rules on specific general ledger codes that eliminate manual corrections or restrict purchasing to a list of approved vendors.

**Better data for more informed decisions.** Better data results in useful information for predicting future business events, such as next month's orders. More accurate data means that the company can adjust inventory levels accordingly. If the demand forecast is accurate, the company can move to a just-in-time inventory solution.

**New sales channels.** Establishing new channels such as a trading exchange, a new distribution network, or direct selling can provide new revenue opportunities.

**New customers.** Establishing a new channel may result in reaching customers that the company is not currently serving effectively.

**New information products.** Technologies may capture data previously not available, and the packaging of this data may provide another product to sell.

**New services.** Extending a business process may facilitate providing value-added services, such as dispute resolution, financial settlement, logistics, and authentication.

**Higher customer satisfaction.** By having a better and deeper relationship with customers, we can ensure happier and more loyal customers who spend more money and return more often. If the company is the easiest and simplest channel to buy from and offers rich customer value (most variety, best information on availability, highest quality, and so on), then the company has a competitive advantage.

Next, we look at different categories of e-commerce, including business-to-consumer (B2C) and business-to-business (B2B).

## B2B versus B2C

Business-to-business (B2B), business-to-consumer (B2C), and consumer-to-consumer (C2C) e-commerce business models describe who is the target buyer market and who is the target seller market. We will focus only on B2B and B2C, since C2C is a relatively small segment by comparison.

B2B describes online transactions between one business, institution, or government agency and another. B2C describes online transactions between a business and a consumer. Examples of B2C sites include Amazon and Yahoo.

Note that although for the most part major e-commerce sites fall into either B2B or B2C, they need not be mutually exclusive. Dell Computer, for example, is both a B2C and B2B site.

### ***B2C E-Commerce***

B2C e-commerce, also known as online retailing, offers the convenience of home shopping over the Internet or by phone, along with lower prices. The business model is based on the lower overhead costs of online sales in comparison to sales at traditional brick-and-mortar stores.

A simpler form of B2C e-commerce, called brochureware, uses an online product catalog and a one-to-one selling technique. The buyers receive product information from the merchant's Web site and can then place an order with an email or phone call. From the Web site, the order is manually entered by a customer service person into back-end systems such as accounting and inventory management, rather than automatically processed by a computer system on the back end.

Most retail Web sites include a product catalog, a shopping basket, and an automated payment system. Products are usually grouped into categories and displayed on the Web site. The shopping basket allows consumers to select and purchase multiple items at once. Automated payment systems accept and approve credit cards online. Many sites have customized advertising, cross-selling and up-selling promotions, and product searches.

Web sites such as brochureware sites that require orders to be manually entered into back-end systems are clearly inefficient. Their lack of integration can also prevent the organization from exploiting potential business opportunities. For example, a computer system that can interchange and aggregate data on a standard platform can also be used to aggregate products across multiple catalogs, create a database of customer preferences, and create effective cross-sell and up-sell promotions.

A business driver for a new standard such as ebXML is to make system integration easier and automate manual processes using a standard platform. A business can handle a higher volume of transactions and reduce overhead costs by processing Web site orders in an automated way.

### ***B2B E-Commerce***

Dell Computer is a B2B site that has uses the Web to implement a build-to-order direct sales model to effectively reach different target audiences. While the majority of Dell's sales are to large companies, its Internet sales are much more weighted toward small businesses. The business model allows the

company to reduce inventory-carrying costs and avoid the markups of resellers and distributors. Using the Web, Dell has also reduced service and support costs.

Vertical B2B sites serve a specific vertical industry, such as chemicals, foods, and telecommunications. These sites focus on understanding industry practices and resolving industry constraints. This means eliminating inefficiencies that lower margins. By automating the vertical supply chains, the B2B sites succeed in making the market more efficient.

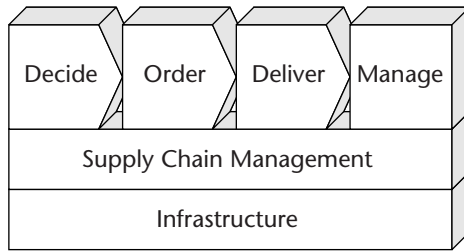
Horizontal B2B sites focus on providing e-commerce capabilities that are common to all industries, such as maintenance, repair, operations procurement, sales and marketing, and human resource services. Horizontal B2B sites seek to make these processes more efficient across different industries.

An *intermediary* aggregates data and facilitates transactions by bringing buyers and sellers together. Many B2B sites serve as intermediaries for other businesses. The intermediaries become virtual marketplaces, with multiple vendors and products, and fall into different pricing models, such as exchanges and auctions.

An *exchange* model is a two-sided marketplace where buyers and suppliers negotiate prices, usually with a bid-and-ask system, and where prices move both up and down. These work best with easily definable products without complicated attributes, such as commodities, perishable items such as food, or intangibles such as electric power. An exchange has fluctuating market prices, and this is useful if a true market price is hard to find. The exchange model works where brokers make high margins by buying low and selling high to purchasers who don't know the original sellers. Exchanges are also known as digital exchanges, online exchanges, dynamic exchanges, and dynamic trading exchanges.

An *auction* model lets multiple buyers bid competitively for products from individual suppliers. The auction is suitable for hard-to-move goods such as used capital equipment (forklifts) and surplus or excess inventory. Prices only move up, but buyers can buy below list prices while sellers sell for more than a liquidator pays. Auctions are becoming a feature of many markets, but some use auctions as their primary market mechanism. One example is OnSale, which has created a marketplace for the market of business surplus (that is, excess inventory and idle assets). OnSale gathers qualified buyers and sellers, facilitating transactions and increasing efficiency. Sellers save such expenses as warehousing, and surplus goods are more accurately priced. Buyers access a global supply of business surplus, benefiting from shorter sales cycles and comparable product information.

A *hub* is an intermediary that aggregates demand from small buyers to negotiate better terms with large sellers. This process can involve horizontal (operating supplies) or vertical manufacturing. The hub model is used for spot



**Figure 1.1** B2B interaction between buyer and seller.

purchasing (using exchange or auction) or systematic purchasing (catalog mechanism). The horizontal purchasing hubs use horizontal logistics (UPS, for example), while the vertical purchasing hubs generally need vertical logistics (for hazardous chemicals, for example) for working with existing distributors.

A new concept in B2B is *business webs*, as defined in the book *Digital Capital* (Tapscott 2000). Business webs are places where buyers and sellers come together to communicate, exchange ideas, advertise, bid in auctions, conduct transactions, and coordinate inventory. They are also known as e-hubs or electronic marketplaces. A business web can either be organized horizontally or vertically. The many-to-many connectivity made possible by the Internet enables buyers to link up with customers, suppliers, and other members of their value chain in business webs so that they can exchange information and trade products and services electronically.

In B2B, whether an exchange, auction, or a vertical or horizontal hub, the opportunities to improve communications between customer and suppliers provide cost savings and sometimes revenue possibilities. *Supply chain management* is an effort to coordinate processes involved in producing, shipping, and distributing products, generally with large suppliers. Supply chain management (as shown in Figure 1.1) provides a foundation for the B2B interaction between the buyer and seller. The B2B business driver for a new standard such as ebXML is to make system integration easier and automate manual processes using a standard platform or shared infrastructure.

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## Building B2B Systems

*Integration* is a buzzword in IT systems. How do we make different applications or components of the same application work together? Most companies, large and small, have a hodgepodge of different systems built at different times from different vendors. The Internet and World Wide Web have only made it harder to keep up, as now the common expectation is that the companies can and will interface their systems to customers and suppliers. Using



their Web storefronts, companies can communicate with back-end operational systems for fulfillment and customer interaction.

In certain B2B models, such as the public online exchange, new technologies may also mean opening up the business model to rivals and competitors. Exchanges enable buyers and sellers to meet new actors and compare prices. In the past, buyers and sellers within the energy industry have negotiated prices and conditions informally, such as at impromptu meetings at industry conferences. It has gathered suppliers and service providers from all over the world to take part in its online exchange, where the participating actors buy and sell energy on a spot market.

Another e-commerce model that has emerged is software enablers, who provide vertical and horizontal B2B with an effective technical infrastructure. An *application service provider* (ASP) provides outsourced hosting services for applications, which allows companies to rent rather than buy applications and services, such as auctions, exchanges, and catalog aggregation. ASPs are often not tied to any one application, plugging a feature of one application into a marketplace when appropriate and using another feature from another vendor elsewhere. Many application software vendors are moving to an ASP hosting model to add revenue opportunities. ASPs provide information publishing tools, catalog software, transactional capabilities, payment services, and customer relationship management functionality, among other services.

B2B exchanges may be an extension of enterprise software or service companies (such as procurement software or IT outsourcing services). In this case the company frequently offers software solutions, such as procurement software, enabling users to conduct purchases more efficiently. Along with providing software products, the companies operate their own Web sites, which provide transaction capabilities and content services, such as industry news and reports, and Internet portals that bring together vendors using a standard format for reading and posting transactions.

In large companies, *enterprise application integration* (EAI) is used to integrate applications among multiple enterprises. In certain industries, such as retail, transportation, and distribution, companies typically need to integrate supply chains tied to fulfillment, shipping, and other internal systems.

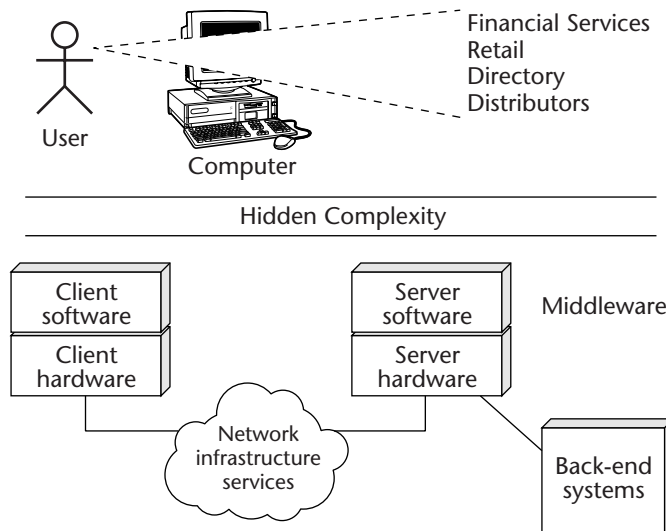
A *back-end system* is an enterprise system that handles order processing, inventory, and receivables management for both buyers and suppliers. A B2C or B2B Web site may link to a back-end financial system to process purchases, and an inventory management system may be used to maintain products in stock.

An *enterprise resource planning* (ERP) application is a complex application used by large enterprises to manage inventory and integrate business processes across multiple divisions and organizational boundaries. The ERP system is often the application backbone in many large enterprises. To deploy an online trading platform, companies must often integrate new technologies with the back-end systems, which can include mainframe or ERP applications.

Many B2B initiatives focus on extending legacy ERP systems, such as purchasing and order entry, to wider audiences inside the enterprise (such as e-procurement) or outside the enterprise (such as digital storefronts). These technologies are a natural evolution of ERP solutions (purchasing and order entry), and much of the value in these B2B systems lies in unlocking and extending the value in existing ERP implementations.

*Middleware* is the integration software that ties together different software platforms and exchanges content and transaction information between companies. Popular middleware platforms include the Java 2 Enterprise Edition (J2EE) from Sun Microsystems, Common Object Request Broker Architecture (CORBA) from Object Management Group, and .NET framework from Microsoft. Vendors have been fighting for ownership of middleware platforms and communication between distributed applications: UNIX vendors pushed the CORBA, while Microsoft backers rallied behind another interoperable technology, the Distributed Component Object Model (DCOM).

Middleware applications can translates messages and transactions into specific formats and integrate data flow from departments such as purchasing, ERP, accounts payable/receivable, and financial reporting. Middleware enables linkage between multiple value chains and the formation of new e-commerce infrastructure. The right middleware can enable companies to rapidly deploy transactional or process interactions. As shown in Figure 1.2, middleware systems provide users with a simplified view of highly complex and technical e-commerce support infrastructure.



**Figure 1.2** How services are provided to users by middleware systems.

An aspect of e-commerce deals with how to exchange data between businesses. A variety of techniques, employing both proprietary and public standards, have been used to manage B2B e-commerce. These methods include developing e-commerce applications and application programming interfaces.

## Developing Applications and Application Programming Interfaces

*Interoperability* is a major theme in a distributed environment. How do we get proprietary applications from different vendors to talk to one another for B2B interchange? (These include both proprietary applications that are developed in-house as well as shrink-wrapped, off-the-shelf commercial applications.) One solution is to define a document interchange format, which is a set of rules for representing documents for the purpose of interchange.

Companies can choose to use the proprietary applications of their trading partner to solve such interchange problems. Rather than building application connectors and other programming plumbing to communicate with the trading partner, they roll out a single proprietary application platform to all partners.

However, this creates other problems—increased cost, complexity, and missed business opportunities. It is difficult to design integrated internal systems that will work with multiple businesses. Adding new trading partners is costly, since the proprietary application has to be rolled out to all partners. Additional manual data entry work is required because of duplicate data inside each trading partner's operational systems. A solution to this problem is using an open system approach to provide a standard interface, using techniques such as an application programming interface to integrate data from different sources within the enterprise.

An *application programming interface* (API) allows usage of specific data or functions in a computer system or application. The data or functions can then be used for writing custom programs that tie into the original program or for modifying the original program. The API per se is just a programming interface; it requires developers to write code to support the desired API functionality. A proprietary API is owned and developed by a company, such as Microsoft's DirectX on Windows, as opposed to a public standard API such as Common Gateway Interface (CGI) on the Web.

Trading partners who want to exchange data can use this API to develop connector code. However, there is a learning curve associated with any API. A new set of APIs is needed for each trading system. The connection mechanism between the companies may create security problems and consume a large amount of system resources.

Another requirement is that data sent through the API has to be converted into a new format. Proprietary solutions for data and document interchange

formats have to be decoded in certain ways. They involve communication with other companies a priori, extensive documentation, coding efforts, and reinvention of tools for transmission. This makes a standard language like XML attractive. Using XML for messaging formats is often easier than designing proprietary formats, and it saves time and resources that would otherwise have been invested in developing and promoting nonstandard formats.

## Web Services

Current trends in e-commerce are creating enormous opportunities and pressures for automation of business processes across business boundaries. These include the need to truly realize the potential and promise of e-commerce by creating virtual enterprises—that is, networks of applications that automate business processes across enterprise boundaries. One area of convergence between application-to-application communication, Internet, and XML is Web services.

A *Web service* is an application service based on the XML carried over the World Wide Web's Hypertext Transport Protocol (HTTP). Web services are used to communicate between applications. In this context, *application service* refers to an application built as a component that fits into other application services. The idea is to leverage the advantages of the Web as a platform applied to the set of *dynamic* services, not just to *static* information. Modern computer technology and new practices, such as advances in object-oriented technology, have changed the rules of the game. In designing systems, we are not tied to static implementations such as software builds, compilers, or mapping tools, and we can move easily to a dynamic and real-time environment.

For example, a large retail chain might use Web services to integrate its supply chain. Using Web services for such a project is a good idea, since these services eliminate custom APIs. Web services give smaller companies incentive to participate in supply chains because interfaces built according to Web services standards can be used to interact with a multitude of partners. If an 800-pound gorilla wants its partners to build the supply chain services, the partner company can leverage its development effort by using the same interface with other customers.

Many major vendors have focused on the need for application communication in B2B. In 2000, Microsoft introduced their .NET initiative to enable the delivery of software over the Web. Microsoft is staking its future, and billion dollar investments on the .NET business model. Based on the Web service platform, the .NET model will allow applications to talk to each other using the XML format.

Within IT departments, software developers are using tools such as Microsoft Visual Studio to create Web services applications that communicate across a wide area network (WAN). A version of the Microsoft developer product

**WEB SERVICES HELPS COMPANY REACH CUSTOMERS**

**“Right now, the Web is mostly person-to-person, but both our clients and third parties want to gain access to each other, system-to-system,” says Tim Hiltenberg, chief technology strategist at Hewitt Associates LLC, a Lincolnshire, Illinois, human resources company. Using a strategy based on B2B technology, Hewitt is working to make life easier for its customers. Hewitt provides employee benefits information, such as 401(k) balances and transactions, to its 250 business customers and their 15 million employees. Hewitt is building its own portal to aggregate all employee benefits information for each client company. Web services will provide the standard application interface to support whatever type of technology is in use at customer sites. The middleware consists of Java servlets, which are server-side programs written in the Java programming language. The middleware resides on the server at Hewitt and contains the business logic for application tasks such as selecting a mutual fund in a retirement portfolio. The company also will be able to give customers easier access to applications provided by third parties such as investment advisers.**

**Source: McDougall, 2001.**

called Visual Studio.NET allows the developer to create Web services using Visual Basic tools. Other Microsoft products, including SQL Server and Exchange Server, allow system administrators to use Web services to communicate with other applications. (See Chapter 3 for more information on Web services technologies.)

## **Electronic Trading and Interchange**

The modern economy depends on moving products and services between businesses that add incremental value to the product or service, or *electronic trading*. The broader concept of computer communications between businesses is referred to as *electronic interchange* or *electronic exchange*, as in electronic data interchange. In this context, a *trading partner* refers to a business involved in electronic trading; typically in a transaction there are two or more trading partners.

Trillions of dollars of transactions take place between businesses each year, most involving paper purchase orders, invoices, and receipts. Electronic trading accounts for a small percentage of all transactions, but it will continue to grow over time as the cost of computer systems decreases while processing power increases. Trading systems allow people to track large amounts of data needed for optimum process efficiencies, which keeps costs down and productivity up. Computers also make it easier for companies to link up with

other companies, since an automated system requires fewer people to maintain it over time and eliminates tedious jobs such as manual data processing. An industry standard for electronic trading is Electronic Data Interchange, which is challenged by new technical standards such as Extensible Markup Language. In the next section, we will compare and contrast these two standards and how they can work together.

## EDI versus XML

B2B application integration isn't new. For some time now, it has bridged the gap between legacy IT infrastructures and emerging B2B collaboration frameworks and allows the IT infrastructure to provide greater adaptability to the business of the enterprise and easier management of constantly evolving business processes. There are two important enabling technologies: Electronic Data Interchange (EDI) and Extensible Markup Language (XML).

EDI was launched in the 1970s as a standard for high-volume online transactions between large companies and their most significant trading partners. One EDI-based trading system and proprietary network used for transmitting EDI transactions is called the *value-added network* (VAN). EDI was the first of many attempts to create a standard way for businesses to communicate over a network. While successful in certain industries, EDI has proved too complex and costly for most.

XML is a more recent invention for exchanging information between computer systems. XML is a markup language used to create *smart* data and documents for applications. XML coexists with the popular Web formatting language HTML. HTML tells us how the data should look, but XML tells us what it means. XML enables complex linking (using XPointer and XLink) and allows users to define their own elements (using a document type definition or schema). It also provides a style sheet for formatting documents (using XSL).

XML and EDI are not exclusive choices. Some systems provide an EDI-to-XML bridge for supporting both EDI-capable and Web-based systems. A newer standard such as ebXML incorporates as part of its design solution some borrowed ideas from both EDI and XML. (We will discuss XML and EDI further in Chapter 2.)

Internet standards such as XML and ebXML offer businesses the opportunity to build an interoperable e-commerce infrastructure. In a computer system, ebXML specifies the business rules for how two different systems talk to each other. Those systems need to be written using a specific application programming language (such as XML, Java, C, C++, or Visual Basic), executed in a specific middleware (like J2EE or COM+), and designed using a specific modeling language (UML).

To model B2B business processes, an abstract computer modeling language such as UML or the XML language-specific Business Process Modeling Language (BPML) is used. BPML is an XML-based meta language for modeling,



deploying, and managing business processes such as order management, customer care, demand planning, product development, and strategic outsourcing.

## Electronic Trading Standards

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The Internet has created opportunities in strengthening the value chain between businesses and between the customers and suppliers. However, because of a lack of standards for application communications at the strategic framework level, coordinating activities between players can be problematic. In early e-commerce initiatives, the heavy lifting in defining e-commerce communication between companies has been left to the individual companies and their internal development teams. An elegant solution to the difficult problem of coordinating large and small industry players is to use public standards. To be effective, the standard must be adopted by a critical mass of players, be able to meet the requirements of many applications, and be simple enough to implement in a reasonable time period.

### What Is a Standard?

A *standard* is an effort to create widespread use of specific protocols and formats to allow software from different vendors to interoperate, often within a vertical industry. Standards bodies or initiatives often work more slowly than entrepreneurial companies in setting up interoperable terms of trade.

A standard is important in an industry where important and complex investment decisions are made independently, but need to be coordinated. For example, compare the lemonade stand business with the computer chip business. As a child, I had a lemonade stand in front of my house. I bought lemons from a farmer (buy side) and sold lemonade to people that passed by (sell side). I would go to a local farm, buy a bushel of lemons. I would clean the lemons and make lemonade by pressing the lemons and adding sugar and water. The business was very simple, but I still had business conventions on buying, selling, and production.

There was no need for standards in the lemonade stand business. This is a cottage industry, and each individual operator had his or her way of doing things. This worked fine because the scope and scale of operations were limited to a small geographical area and a few people. I did not need an automated system to keep track of sales, logistics, or inventory. That would have been overkill and would have added dramatically to my overhead.

On the opposite end of the scale, a large corporation is often interested in business and technical standards in its industry. A standard provides the center of gravity for industry players to orient themselves and coordinate investment decisions. Planning an integrated computer chip production factory that costs billions of dollars involves deciding whether it will produce chips to

design specifications from Intel, such as the popular Pentium processor, or its rival AMD. This decision will also impact the factory's suppliers and customers. Hence, because of the greater scope and scale of operations in certain industries, such as technology, automotive production, and commercial transportation, we need public standards for the coordinated planning of independent operators for investment decisions regarding shared infrastructure. In e-commerce this infrastructure may account for billions and ultimately trillions of dollars in trading volume.

How can a standard such as ebXML add value? Assume we adopt a new standard, either a business process standard such as ISO 9000 or a technical standard such as ebXML. If we have new customers or suppliers that use the standard, then we do not need to invest in additional nonstandard infrastructure to support that organization (in theory, at least). This may help create new opportunities to cut costs from the bottom line by coordinating investment decisions between supplier and customers. ebXML focuses on coordinating systems between companies so they can communicate more effectively. With ebXML as a standard, a company can leverage its one-time investment in both IT and business infrastructure over a larger volume of e-commerce transactions over a longer period of time.

## Standard versus Specification

There is a distinction between a standard and a specification. A technical *specification* defines how a technology *should* work (methods) and *should not* work (constraints). By contrast, a *standard* is a collective agreement by industry players on a set of technical principles often captured in a specification. A standard organization helps promote wide use of specific standards so software and systems from different vendors can interoperate. To be a de jure standard, a standard body such as the International Standard Organization (ISO) has to endorse the technology and its specification. This can be a long and tedious process.

In practice, technologies may become a de facto standard by the fact that they are in use by most of the important players in the industry. This can occur with or without an official endorsement from a standard organization. For example, the Windows architecture is owned by Microsoft, who can design to its own specifications based on marketing requirements. Since Windows is the desktop operating system on over 90 percent of PCs, we can safely say it is a de facto standard, regardless of the opinions that certain standard bodies may have to the contrary.



## Open Standards versus Proprietary Standards

The *open standard* (also known as a vendor-neutral standard) in the computer system context is based on a set of technical specifications for protocols and systems that is jointly created by many companies or industries. An example of an open standard in recording media is the VHS format for videocassettes. The basic idea of *open-ness* is that software specifications are publicly available and a single vendor does not own the architectural design for the software solution. By contrast, a *proprietary system* is based on a set of technical specifications owned by a single vendor and relies on the system and protocol design of the vendor. Windows is an example of a proprietary system, since it is the computer architecture owned by Microsoft.

There are some standard initiatives backed by specific companies, such as BizTalk (Microsoft). These quasi-proprietary standards are attempts to provide some type of standard interface from proprietary applications and platforms (such as Windows) to other systems. BizTalk is a set of guidelines for how to publish schemes in XML and how to use XML messages to easily integrate software programs together in order to allow extended business transactions. BizTalk consists of a message framework and repository for schema written for that framework, as well as a server product from Microsoft. This initiative leverages existing industry data models, solutions, and application infrastructure and adapts them for electronic commerce through the use of XML.

Building systems based on open standards, as opposed to single-vendor solutions, ensures both stability and a larger base of potential trading partners supporting the infrastructure. ebXML is an open standard for electronic trading, and it uses an open process for soliciting input into the specifications, which has pluses and minuses. On one hand, the open process draws in the best ideas from different places into a broad, overarching vision that applies across industries for how to communicate between businesses. On the other hand, the democratic process of decision making in the ebXML committee organization may take a lot longer, compared to defining a proprietary standard where ultimate authority resides in a designated few within the organization.

## Why ebXML?

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Standards are necessary to promote transparent communications across the many systems operating in the enterprise. Most information technology environments are heterogeneous, rather than homogeneous. This means that the environment is made up of hardware, software, and other components that may not be standard and represent a variety of standards, products, and vendors, rather than an enterprise view with accepted standards. Standards are important in providing the rules via which information technology products

interact. They are needed to ensure that systems can communicate, which is essential in an evolving network-centric strategy. Standards such as network protocols and interfaces between applications allow systems on a variety of hardware, and even operating system platforms, to share information and data.

ebXML addresses some of the technical problems in implementing B2B systems with traditional EDI standards. In an interview between the author and Scott Nieman, a technical expert involved with both the ebXML and X12 initiatives, we concluded that some key reasons based on research by UN/CEFACT and X12 for low rates of EDI deployment include:

- The EDI standards, such as EDIFACT and X12, are ambiguous. They were designed to be as generic as possible so that they can be applied to all vertical industry needs and individual company needs. Each company must create an implementation guide to provide context for their usage of the standard. While the intent was that EDI would be *the* standard format for B2B, the end result is a myriad of differing formats.
- The business case expressed in terms of the EDI business process usage and improvement was not published with the standards. Therefore, EDI users, managers, and developers are often confused about how the EDI standards apply to their business process.
- The ambiguity of these formats and lack of process information have led to excess trading partner negotiation that consumed over 70 percent of the implementation time.
- The EDI standards were based on technical capabilities of mainframe systems from over 30 years ago, and data processing was batch-oriented and scheduled, compared to the interactive processing ability and vast processing power common today.

Many e-commerce standards today are based on XML, which provides a flexible way to describe product specifications or business terms. Many businesses are implementing XML solutions based on the technical specifications issued by the W3C and the XML-based business standards of various XML groups. These businesses require a mechanism and migration path for accommodating legacy EDI solutions based on accredited standards and XML solutions already in progress or implemented. Companies like IBM, Sun, Microsoft, and CommerceOne that have major stakes in online transactions are driving to push standardized B2B transaction formats.

Some relevant electronic trading standards efforts to help different industries communicate online with each other include Microsoft's BizTalk, Open Buying on the Internet (OBI) by the industry association CommerceNet, and RosettaNet by the computer manufacturing industry. ebXML may converge with some other standards; for example, Microsoft may introduce ebXML features and compatibility into the BizTalk framework and the associated

BizTalk products based on user demand. One drawback to the competing commercial solutions available compared to a public standard such as ebXML is that the proprietary solutions usually lack widespread support from the business verticals.

As standards are widely adopted, companies will better manage portfolios of B2B capabilities and interface with third parties with limited resources and short technology life cycles. Many industry players will use the industry standard communication languages and protocols, such as XML and Simple Object Access Protocol (SOAP), as well as transaction definition frameworks, such as ebXML, RosettaNet, and BizTalk.

See Chapter 4 for further discussion of ebXML architecture compared with BizTalk and RosettaNet.

#### **BEFORE EBXML: A BRIEF HISTORY OF B2B E-COMMERCE STANDARDS**

In this sidebar, we discuss a bit of history on relevant standard initiatives in the last decade (1990 to 2000). ebXML was the end result of pioneering efforts at merging the Internet, XML, and EDI that converged with major industry efforts to create public standards in e-commerce.

Early efforts in combining the EDI standard with modern technology introduced creative innovations but did not reach critical mass in most industries. An early initiative combining the Internet and EDI was Open-EDI. The standard EDI model is based on a closed model of interaction, in which the trading partners are linked through a secure and trusted connection. Each party in the relationship must have detailed knowledge about the other. Open-EDI reduced the tight coupling required between business partners, since the closed model is too restrictive for Internet-based applications. Another early model in combining XML and EDI is called XML/EDI, an idea pioneered by David R. Webber, which drew industry attention to the need to combine the aging EDI infrastructure with the technical benefits of XML. Many of the good ideas and solutions in XML/EDI and other forerunners would be later incorporated into ebXML, and these early models provided significant contributions to the ebXML specifications.

Compared to EDI, XML is more adaptable and easier to use, but the flexibility and lack of constraints in XML has its drawbacks. A major problem was the splintering of XML into different communities of interest, each with its own dialect of the XML language. These efforts by independents lack widespread cohesive support and critical mass. One industry observer commented: "I'm a big supporter of XML, but XML is fragmenting into multiple standards as we speak. The fragmentation of the standards is going to seriously retard the adoption of those standards into B2B environments. We have associations like RosettaNet promoting one version of XML. We have the World Wide Web Consortium promoting its own version. Commerce One is promoting its own version. Ariba is promoting its own version."

*(continues)*

**BEFORE EBXML: A BRIEF HISTORY OF B2B  
E-COMMERCE STANDARDS (Continued)**

Industry-specific initiatives such as RosettaNet introduced important technical innovations but failed to attract participants outside the semiconductor industry. A proprietary standard such as Microsoft BizTalk has its advocates among companies using a Windows-based platform with its early-to-market implementation and cohesive architecture, but it lacks uniform support among companies with heterogeneous systems or systems primarily based on non-Windows platform, such as UNIX or mainframes. From the flowering of ideas during the last decade, ebXML emerged as the dominate solution by major standards organizations to address the need for combining modern techniques in XML with EDI and to provide public standards in growth areas in e-commerce, such as Internet-based B2B exchanges.

Early in 1999, members of the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), as a committee called Techniques and Methodologies Working Group (TMWG), made recommendations for a new standard work based on XML. They convinced the group to approach an international technology business consortium called Organization for the Advancement of Structured Information Standards (OASIS) for the formation of ebXML. The primary authors of the recommendation were Scott Nieman, who is also the vice chair of Strategic Implementation Task Group in X12, and Bob Glushko of CommerceOne, with Mike Adcock as a contributor.

In September 1999, UN/CEFACT and OASIS announced they were joining forces to produce a global XML framework for electronic business. More than 120 companies and standards bodies participated in the ebXML initiative. After 18 months, at the May 2001 meeting in Vienna, more than 1,000 participants ratified the first generation of ebXML and began delivering the infrastructure.

At this ratification meeting a proof-of-concept demonstration was shown where more than two dozen companies and organizations implemented ebXML. Based on ebXML standards, a sample supply chain information environment was built using ebXML architecture. It proved ebXML standards are relatively easy to work with.

On May 11, 2001, UN/CEFACT and OASIS signed a new memorandum of agreement for continuing the ebXML work. The agreement assigned the infrastructure component to OASIS (transport, registry/repository, and collaborative profile protocol). UN/CEFACT kept the business components (business process and core components).

## **ebXML Players and Politics**

As mentioned in the sidebar, the direct sponsors of ebXML are UN/CEFACT and OASIS. In addition, standards bodies involved in ebXML include National Institute of Standards and Technology (NIST) and World Wide Web Consortium

(W3C). OASIS is a nonprofit, international consortium that creates interoperable industry specifications based on public standards such as XML and SGML, as well as others that are related to structured information processing. OASIS, founded in 1993 under the name SGML Open, was originally a consortium of software vendors and customers devoted to developing guidelines for interoperability among SGML products. It has more than 170 organizational members, including the world's leading technology firms.

UN/CEFACT is a United Nations group set up in 1996 to respond to new technological developments and to officially recognize the contributions made by experts. The United Nations also produces the EDI standard called UN/EDIFACT. UN/CEFACT has a memorandum of understanding with the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) that the work efforts each organization produces may be fast-tracked through each other's processes.

ISO is an organization of national standards bodies from various countries established to promote the development of standards to facilitate international exchange of goods and services and to develop cooperation in intellectual, scientific, technological, and economic activity.

The W3C develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential as a forum for information, commerce, communication, and collective understanding.

ebXML supporters include a large number of industrial, shipping, banking, and other general-interest companies, as well as key technology companies. Members of the Global Commerce Initiative (GCI) plan to use ebXML as the backbone of their new data exchange standard for B2B trade in the consumer goods industry. ebXML will provide the technical infrastructure for the Global Commerce Internet Protocol, a set of recommendations governing the management of data for Internet communication and other B2B interactions. The GCI members include 40 major manufacturers and retailers as well as 8 trade associations, which in total represent 850,000 companies around the world. Also included are exchanges such as Transora, the WorldWide Retail Exchange, and GlobalNetXchange.

The UCC has made major contributions to the GCI effort in ebXML to quickly standardize Internet trading in the consumer products industry with the first in a series of electronic commerce standards. The UCC is an organization founded to administer the Universal Product Code (UPC), the standard barcode that can be read and interpreted by a computer, commonly used to mark the price of items in stores. The UCC has extended its role to establishing and promoting global multi-industry standards for product identification, business processes, and electronic communications. Its electronic communication standards are geared to enhancing supply chain management.

ebXML is designed through a collaborative and open process with no barriers to entry. With the open development process, anyone can become involved in

the definition of ebXML specifications—in theory, at least. Actual participation in the specification development process is fairly time-consuming and tedious. Certain e-commerce initiatives in specific industries involved with ebXML, such as automotive and transportation, are also open to individuals or companies involved in that particular industry.

## **Arguments for and against ebXML**

To make a rational decision on whether or not ebXML is right for your organization, we need to examine some of the arguments for and against ebXML. The standards promote migration to enterprise solutions with reduced complexity and support. The establishment and governance of enterprise standards require a constant balancing between too much control and not enough. Standards are both beneficial and detrimental, depending on the perspective of the user. The standards must provide the right amount of flexibility so that the business is not constrained.

Klaus-Dieter Naujok, chairman of the ebXML Initiative, and Ralph Berwanger, vice chairman at the American National Standards Institute's Accredited Standards Committee X12, two of the men who helped manage the ebXML effort, offer the following arguments in favor of ebXML (Naujok 2001):

- “The strongest argument for using the specifications is that they are built upon established technology.” ebXML uses proven technology as the baseline for all specifications. This did not require inventing new protocols. The ebXML design leveraged from as much existing technology as possible, including the W3C's XML Schema, XML Linking Language, and the XML Signature Syntax and Processing specification.
- Another argument for ebXML is that “the user and vendor communities are being provided with a set of specifications that have been proven to work.” During multiple public demonstrations from many companies, the proof of concept trials proved that the ebXML architecture could work and interoperate with other systems. The trials included the entire ebXML infrastructure working end-to-end, ebXML system components that can talk with other components in a network, and components from multiple vendors integrated as a single user-driven solution.
- The last argument for ebXML is that “the infrastructure is the only open, out-of-the-box, standards-based solution available and ready for use.” ebXML uses open technology based on XML and is independent of the underlying transport protocol, such as HTTP. The ebXML solution allows traditional Electronic Data Interchange, XML-based or proprietary payloads to be sent between businesses and partners using common or different vocabularies.



The arguments against ebXML are:

- It's expensive and time-consuming to implement. Many businesses have extensive EDI architectures and character sets based on accredited EDI standards. They need to be able to interoperate between these existing solutions and new systems based on ebXML. They also need to account for the costs of building and maintaining the new ebXML systems. Companies are in business to make money, and the return on investment is uncertain at this point.
- ebXML is a risky investment. Naujok states, "implementing version 1 of anything can be risky. Prudent consumers wait while the foolhardy dive in to find undocumented features. Why should either the vendor or user communities implement the first generation of the ebXML specifications?"

Unless there is a good business reason, such as a major customer downstream or a major supplier upstream in the supply chain using ebXML, a standalone business may not have sufficient cause to move to the ebXML standard.

ebXML is not a cure-all for business problems, but it addresses many of the issues in building electronic trading systems, especially with communicating between proprietary applications and systems in a heterogeneous environment.

## Summary

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E-commerce covers a broad spectrum of online businesses, from the individual consumer buying collectibles on an auction site such as eBay to real estate agents listing properties and advertising representation services to large corporations with a multitude of products and services. The general categories of e-commerce business models are business-to-business (B2B), business-to-consumer (B2C), and consumer-to-consumer (C2C).

A standard is an effort to create widespread use of specific protocols and formats to allow software from different vendors to interoperate, often within a vertical industry. Many e-commerce standards today are based on XML, which provides a flexible way to describe product specifications or business terms.

Electronic business XML (ebXML) is an emerging e-commerce standard for electronic trading between companies. It consists of a set of specifications developed by standards bodies to set guidelines on building e-commerce software that complies with the standard.

The typical large e-commerce system integration project will require a common language such as Extensible Markup Language (XML) and a public standard such as Electronic Data Interchange (EDI), RossettaNet, ebXML, or a popular proprietary equivalent such as Microsoft's BizTalk.

In the next chapter, we dive into the technical details regarding two technologies important for understanding ebXML—XML and EDI. XML is a markup language used to create *smart* data and documents for applications. EDI is a standard, often used for high-volume online transactions between large companies and their trading partners.